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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/714,528

11/14/2003

Daniel F. Sievenpiper

B-4345CIP 621324-5

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01/18/2006

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EXAMINER

TAKAOKA, DEAN O

ART UNIT

PAPER NUMBER

2817

DATE MAILED: 01/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/714,528

Applicant(s)

SIEVENPIPER, DANIEL F.

Examiner

Dean O. Takaoka

Art Unit

2817

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 15-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-11 is/are allowed.
- 6) ☒ Claim(s) 15,26-28,38 and 39 is/are rejected.
- 7) ☒ Claim(s) 16-25,29-37 and 40 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 March 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/19/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 28, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. (U.S. Patent No. 6,515,635), Applicant's prior art cited in the IDS dated August 23, 2004 in view of Ito et al. (U.S. Patent No. 6,337,668).

Claim 15:

Chiang et al. shows a switch arrangement comprising a plurality of MEMS switches (905 – col. 7, lines 17-19) arranged on a substrate (310 – Fig. 3) about a central point (i.e. RF signal port to central point 630 – Fig. 7), each MEMS switch being disposed on a common imaginary circle (inherent where five antenna elements are spaced equally at 72° intervals – col. 4, lines 14, 15; where the length of transmission lines connecting the switches are the same length, i.e. 50 ohms – col. 4, lines 60-63 and Fig. 7 showing lengths of $\lambda/4$, thus where the switches are spaced equally on the common imaginary circle); and connections for connecting an RF port of each one of the MEMS switches with the central point (where switch 400 shown in Fig. 9 provides connections of each switch 905 to central RF signal port) but does not show where the diameter of the common imaginary circle is less than one half wavelength of frequencies in a passband of the switch arrangement.

Ito et al. shows a nearly identical switch arrangement comprising switches disposed in on a common imaginary circle having a diameter which is less than one half wavelength of frequencies in a passband of the switch arrangement (col. 4, lines 31,32; where the antenna elements, i.e. 102, 103 see Figs. 8, 10 et al., are disposed at a distance of $1/8\lambda$; where the adjacent switches are shown equidistant from the respective antenna element/s, thus inherently also $1/8\lambda$ and less than $1/2\lambda$).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the switch distance disclosed by Chiang et al. with the switch distance disclosed by Ito et al. Such a modification would have realized the advantageous benefit of providing a high-gain antenna apparatus with directivity switching capability (col. 1, line 58 to col. 2, line 5 – Ito et al.); further where Ito et al. teaches the advantage over the prior art such as shown in Fig. 1B of Ito et al. which is nearly identical to that shown by Chiang et al. (Fig. 7); further where Ito et al. and Chiang et al. both teach a directive antenna array overcoming problems associated with Yagi type antennas (col. 1, lines 40-42 – Chiang et al.; col. 1, lines 59-63 – Ito et al.) thus suggesting the obviousness of the modification.

Claim 28:

A method of making a switch arrangement (where the method is generic and defines or is defined by the final product, thus the final product of Chiang et al. and Ito et al. defining or defined by the generic method) comprising disposing a plurality of MEMs switches on a substrate in a circular pattern about a point; disposing a plurality of RF lines (415) disposed in a radial pattern relative to the point on the substrate (Fig. 9); and

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connecting the plurality of RF lines to a common junction at the point on the substrate (RF signal port of switch 400 – Fig. 9; discussed in the reasons for rejection of claim 15 above) via the plurality of MEMs switches (905) where operation of one of the plurality of MEMs switches couples to one of the plurality of RF lines to the common junction but does not show where the diameter of the common imaginary circle is less than one half wavelength of frequencies in a passband of the switch arrangement.

Ito et al. shows a nearly identical switch arrangement comprising switches disposed in on a common imaginary circle having a diameter which is less than one half wavelength of frequencies in a passband of the switch arrangement (col. 4, lines 31,32; where the antenna elements, i.e. 102, 103 see Figs. 8, 10 et al., are disposed at a distance of $1/8\lambda$; where the adjacent switches are shown equidistant from the respective antenna element/s, thus inherently also $1/8\lambda$ and less than $1/2\lambda$).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the switch distance disclosed by Chiang et al. with the switch distance disclosed by Ito et al., for the same reasons discussed above with respect to claim 15.

Claim 38:

Chiang et al. teaches a plurality of MEMS switches arranged on a substrate about a common RF port, the RF port having a centerline (RF signal port of switch 400 – Fig. 9; discussed in the reasons for rejection of claim 15 above) and each MEMS switch being disposed spaced equidistantly from the centerline of the RF port (switches 905 in Fig. 9, with respect to the 360° five element 72° arrangement in Fig. 3, and where

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Fig. 7 identifies $\lambda/4$ length of the switch/s to the central point 400, discussed in the reasons for rejection of claim 15 above); and connections for connecting an RF contact of each one of the MEMS switches with the common RF port but is silent where the switches are spaced equidistantly by a length of less than one-quarter wavelength.

Ito et al. teaches a similar plural antenna array (Figs. 11 and 12) connected to switches (307 – 310) where the switches are spaced equidistantly by a length of less than one-quarter wavelength (where Ito et al. teaches the antenna elements being spaced $1/8\lambda$ – col. 4, line 32, thus where connected switches are obviously connected less than $1/4\lambda$).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the switch distance of $\lambda/4$ disclosed by Chiang et al. with the switch distance of less than one quarter wavelength disclosed by Ito et al. for the same reasons discussed above with respect to claim 15.

Claim 39:

Where the centerline of the RF port is disposed perpendicular to a major surface of the substrate (where n is perpendicular to 310 – Fig. 3).

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. and Ito et al. as applied to claim 15 above, and further in view of Sievenpiper et al. (U.S. Patent No. 6,366,254), Applicant's prior art cited in the IDS dated August 23, 2004.

Chiang et al. and Ito et al. teach the switch arrangement comprising a plurality of MEMs switches (discussed in the reasons for rejection of claim 15 above), where the antenna array comprises well-known Yagi antennas but does not teach the antennas comprising well-known Vivaldi antennas or comprising a cloverleaf pattern.

Sievenpiper et al. (Figs. 3,4) shows a similar antenna array with switch controls comprising well-known end-fire Vivaldi antennas in a cloverleaf pattern.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the Yagi antennas disclosed by Chiang et al. with the end-fire Vivaldi antennas in a cloverleaf pattern disclosed by Sievenpiper et al. Such a modification would have realized the advantageous benefit of providing horizontal polarization with antennas having a directivity four times better than an omnidirectional antenna (Sievenpiper et al.; col. 5, lines 17-33) thus suggesting the obviousness of the modification.

Response to Arguments

Applicant's arguments, see page 3, filed November 10, 2005, with respect to the rejection(s) of claim(s) 15, 28 under 102(e) and claims 26, 27, 38 and 39 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Chiang et al. in view of Ito et al.

Allowable Subject Matter

Claims 1 – 11 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Chiang et al. and Ito et al. show plurality of equidistantly spaced MEMS switches arranged on a substrate on an imaginary circle about an axis where Ito et al. teaches the diameter of the circle being less than one half wavelength but neither Chiang et al. nor Ito et al. teaches or suggests at least the limitations of claim 1 comprising a conductive via in the substrate arranged in parallel to and on said axis or further connecting the RF port of each one of the MEMS switches with the conductive via.

Chiang et al. at best shows a central antenna element (1000 – Fig. 10) generically connected to central switch element 400 (to connection O) where the connection in view of central switch 400 (Fig. 10) does not teach or suggest “a *conductive via in the substrate arranged parallel to and on said axis*” and/or “*connections for connecting a RF port of each one of said plurality of MEMS switches with said conductive via*” where there is no connection of the plurality of switches with the conductive via where central switch 400 connects each branch as well as central antenna 1000 separately to the RF port.

Ito et al. also shows a similar arrangement where switches are shown generically on the same side as the extending antennas, further where there does not appear to be any connection of a central via, where although a central antenna is shown (Fig. 12), no connections are shown connecting all switches with the central point; further where Fig. 29 shows a disc shaped arrangement where the central are appears void or comprising air the precluding any central via, thus the prior art does not teach or

suggest at least the limitations of claim 1, nor would it be obvious to combine the prior art of record, thus the claims are allowable.

Claims 16 – 25, 29 – 37 and 40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dean O. Takaoka whose telephone number is (571) 272-1772. The examiner can normally be reached on 8:30a - 5:00p Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Pascal can be reached on (571) 272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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January 11, 2006